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# The Entrepreneurial Commons: Reframing the Relationship Between Intellectual Property and Entrepreneurship

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# THE ENTREPRENEURIAL COMMONS: REFRAMING THE RELATIONSHIP BETWEEN INTELLECTUAL PROPERTY AND ENTREPRENEURSHIP

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## I. INTRODUCTION

I begin with two stories about intellectual property and entrepreneurship. The first takes place at the birth of modern communications. Alexander Graham Bell is credited most frequently with the invention of the telephone.[1] At the very least, he was the pioneering force behind its commercialization and widespread adoption. But he faced a significant enemy in Western Union, the nation's leading telegraph company, whose business model was threatened fundamentally by voice communication over wire. The Bell Company "was little more than a typically hopeless start-up,"[2] while Western Union "brought overwhelming advantages: capital, an existing nationwide network of wires, and a close relationship with newspapers, hotels, and politicians."[3] Western Union entered the market for telephone service with significant force, hoping to consign the fledging Bell Company to niche status or force them to sell.[4] Bell fought back with the only weapon in its arsenal: a patent on the critical technology. Bell filed an infringement suit against Western Union in 1878, leading to one of the most significant patent

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[1] This statement is the subject of great debate and much historical scholarship. There were several parties working on telephone technology at roughly the same time. *See, e.g.*, Mark A. Lemley, *The Myth of the Sole Inventor*, 110 MICH. L. REV. 709, 720–22 (2012) (summarizing competing claims of inventorship). Although Bell prevailed as a legal matter with respect to the most important patent to cover the technology, other inventors have just as good if not better claims to be the actual inventors of the telephone. *See* CHRISTOPHER BEAUCHAMP, INVENTED BY LAW: ALEXANDER GRAHAM BELL AND THE PATENT THAT CHANGED AMERICA 3–5 (2015).

[2] TIM WU, THE MASTER SWITCH: THE RISE AND FALL OF INFORMATION EMPIRES 17 (2010). The company that bore Bell's name eventually came to be a government-sanctioned monopoly itself, and was the sole provider of telephone service nationwide until its breakup in 1984. *Id.* at 17.

[3] *Id.* at 26.

[4] *See id*. at 25–27.

cases of the era.[5] Bell emerged victorious, with his patent valid and infringed, and a settlement that kept Western Union out of the telephone business.[6]

The second story takes place over one hundred years later, as that same technology neared its demise. In the late 1990s and early 2000s, internet technology had become sufficiently well-developed that it posed a disruptive threat to providers of traditional telephone services. Companies like Vonage offered consumers low-priced telephone service that utilized the packet-switched internet to transmit calls to and from traditional phone lines, rather than relying solely upon the wireline incumbent phone companies.[7] This situation mirrored the start of the telephone industry, but with the places reversed. The descendants of the Bell Company were the monopolists, and Vonage was the startup that threatened to undermine their core business model with new technology. And there was another crucial difference: this time, the important patents were in the hands of the incumbents, who deployed them in litigation against the startup.[8] Sprint, Verizon, and AT&T each extracted settlements from Vonage totaling around $200 million, "which was about one quarter of Vonage's annual revenue at the time."[9] As a result, "Vonage's marketing expenditures decreased, and its subscriber growth slowed substantially. Indeed, Vonage was almost delisted from the New York Stock Exchange, and some observers predicted bankruptcy."[10]

These two stories may prompt opposite conclusions about the relationship between patents and entrepreneurship. The first story demonstrates, as Tim Wu puts it, that "in the hands of an outside inventor, a patent serves . . . as [a] sort of corporate shield that can prevent a large industrial power from killing you off or seizing control of your company and the industry." In this view, patents help "sow the seeds of creative destruction."[11] The second story, on the other hand, is, in Ted Sichelman's words, one of "patent bullies," who "assert their patents against entrants to prevent innovative, disruptive technologies from competing with the bullies' outmoded products,"[12] and thereby stifle rather than promote innovation.

It is easy to draw from these competing stories the conclusion that the relationship between patents and entrepreneurship simply depends on context. It depends on the relative competitive positioning of startups and incumbents; on the nature of the technology that the startup is seeking to commercialize; on the structure

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[5] *See* BEAUCHAMP, *supra* note 1, at 54–56.

[6] *See* WU, *supra* note 2, at 30–31. To be fair, the settlement was possible not only because of Bell's success in litigation, including in the Supreme Court of the United States, but also because of intervening business events. *See id.*

[7] *See* Ted Sichelman, *The Vonage Trilogy: A Case Study in "Patent Bullying,"* 90 NOTRE DAME L. REV. 543, 554–56 (2014) (describing the founding and early history of Vonage).

[8] *See id.* at 551–52 (discussing the patent lawsuit brought by Sprint, Verizon, and AT&T against Vonage).

[9] *Id.* at 573 (citations omitted).

[10] *Id.*

[11] WU, *supra* note 2, at 30.

[12] Sichelman, *supra* note 7, at 549–50.

and function of the entrepreneurial community, including other companies and sources of financing, of which the startup is part. But "it depends" is hardly a satisfying explanation of the relationship between IP and entrepreneurship; the question "on what?" follows naturally and inevitably.

The existing literature on patenting and entrepreneurship[13] that tries to answer that question incorporates two assumptions. First, it takes the existing arrangement of patent rights and institutions as a given and asks how that arrangement affects startup companies. Second, it sees startups as atomistic, individual enterprises. To be sure, this literature has produced interesting and useful results that have helped advance our understanding of the ways in which startups respond to and interact with the current patent laws. But it is unlikely to provide a satisfactory explanation, to take one example, for the divergent experiences of Bell and his latter-day internet-based successors. To fully explain why patents seem to work differently in different settings, we need a more systematic understanding of the roles that IP plays within and among entrepreneurs, startup companies, sources of funding, and the larger business and innovation ecosystems of which they are a part. And to interrogate whether our current IP laws are working in a way that best promotes and facilitates entrepreneurship and capital formation, we need to think of intellectual property laws not as a set of external constraints, but rather as endogenous tools for accomplishing particular goals.

This Article therefore offers a different conceptual and methodological framework for investigating the links between intellectual property and entrepreneurship. Rather than starting with the existing IP regime as a baseline and asking how entrepreneurial ventures behave with respect to that regime, this Article proposes starting with entrepreneurial activity and identifying how and why intellectual property might play a supporting role. My account of entrepreneurship places the generation and sharing of information at its center.[14] It posits that ideas and their implementation are the primary source of value for entrepreneurs.[15] Entrepreneurship in this view is the process by which individuals and firms generate, produce, and disseminate innovations in business and technology.[16] Entrepreneurs begin with an idea, they secure funding to develop that idea, and they figure out how to commercialize the idea and build a business from it. These intertwined processes all take place in an environment in which entrepreneurs do not act alone. They

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[13] Of course, other forms of intellectual property are deeply important to the entrepreneurial process. Copyright looms large in the creative industries, and all firms rely upon trademarks as critical components of their branding strategies. Nevertheless, this Article focuses on patents and technology-based startups.

[14] A note on terminology: This Article uses the word "sharing" not in an altruistic sense, but in the sense of exchange.

[15] *See, e.g.*, D. Gordon Smith & Darian M. Ibrahim, *Law and Entrepreneurial Opportunities*, 98 CORNELL L. REV. 1533, 1535 (2013) ("We adopt the widely held view that entrepreneurial opportunities are *ideas created by entrepreneurs*, rather than *resources waiting to be discovered*.").

[16] *See infra* Part III.C.

interact all of the time with funders, business partners, and competitors, often, though not always, in geographically distinct clusters.[17]

To study systematically these intertwined processes, I borrow from the literature on governance of knowledge commons. A knowledge commons is a form of "institutionalized community governance of the sharing and . . . creation of knowledge, data, and other types of intellectual and cultural resources."[18] Some well-understood examples of knowledge commons include patent pools, open-source software projects, and Wikipedia.[19] These arrangements share several common (no pun intended) characteristics. Each involves the coordinated sharing of critical information resources. Each has institutionalized mechanisms for governing that sharing. And each relies on a mix of formal and informal rules and norms—including, sometimes and in complex ways, intellectual property—to support those mechanisms.

Borrowing and adapting concepts and methodologies from Elinor Ostrom's pioneering studies of natural resource commons,[20] the knowledge commons framework makes two contributions to our understanding of the role of intellectual property in information production. First, as a substantive matter, it focuses the analysis of information production and dissemination on context and complexity. Second, as a methodological matter, it focuses on deep analysis of case studies to shed light on that context and complexity in intellectual and cultural production.

The bulk of this Article further adapts the knowledge commons framework to the study of entrepreneurship. I offer three key activities that entrepreneurs and their associated firms engage in—product development, competitive positioning, and fundraising—as examples of knowledge commons within the entrepreneurial ecosystem.[21] In each of these activities, there is a distinct, but sometimes overlapping set of actors. The relationships among those actors with respect to the production of new innovations all require some exchange or use of valuable information. Tracing the rules and practices that govern that use and exchange

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[17] *See, e.g.*, ANNALEE SAXENIAN, REGIONAL ADVANTAGE: CULTURE AND COMPETITION IN SILICON VALLEY AND ROUTE 128, at 2–3 (1994).

[18] Brett M. Frischmann et al., *Governing Knowledge Commons*, *in* GOVERNING KNOWLEDGE COMMONS 1, 3 (Brett M. Frischmann et al., eds., 2014).

[19] Brett M. Frischmann, *Two Enduring Lessons from Elinor Ostrom*, 9 J. INSTITUTIONAL ECON. 387, 402 (2013).

[20] *See, e.g.*, ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION 1–2 (1990) (describing the problems associated with governing and managing natural resource systems).

[21] These three business functions are meant as examples and not a comprehensive list of the entrepreneurial activities that might be modeled as knowledge commons. Other such activities might include marketing, pricing, manufacturing, quality control, and so forth. My argument here is limited to "proof of concept"—I use these three examples to demonstrate the analytic power of the knowledge commons framework applied to entrepreneurship, but not to explore its reach.

should yield valuable insights into the roles that intellectual property might play in the entrepreneurship process.[22]

The argument proceeds as follows. Part II reviews the existing literature on IP and entrepreneurship to demonstrate the existence of significant gaps in our understanding of that relationship. Part III then articulates a framework for systematic analysis of those gaps. It explains that commons governance is a part of numerous entrepreneurial activities, and focuses attention on two aspects of entrepreneurship that are mostly overlooked in the legal literature: information exchange and collaboration. Part IV concludes with some notes on methodology and proposals for further research.

## II. EXISTING STUDIES OF PATENTING AND ENTREPRENEURSHIP

Most existing studies of the relationship between intellectual property and entrepreneurship focus on the effects of various IP laws on entrepreneurial behavior. They focus, in other words, on how startups utilize and encounter the existing arrangement of IP laws. To be sure, this approach offers some valuable insights, but it does not provide a complete picture of the ways in which intellectual property and entrepreneurship interact.

One line of inquiry asks why entrepreneurs choose to patent (or not to patent) their inventions. The classic economic justification for patents is that they offer an ex ante incentive to invent by providing the exclusivity needed for inventors to recoup their investments in otherwise freely appropriable research and development.[23] But the evidence that the prospect of a patent encourages invention that would not otherwise have been undertaken is notoriously weak, among both startups[24] and established companies.[25] The facts that "the average expected value

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[22] The "commons" terminology and methodology has not previously been applied to the study of entrepreneurship in the legal literature. Management scholars, on the other hand, have started to use the framework. *See, e.g.*, Sonali K. Shah & Cyrus C.M. Mody, *Creating a Context for Entrepreneurship: Examining How Users' Technological and Organizational Innovations Set the Stage for Entrepreneurial Activity*, *in* GOVERNING KNOWLEDGE COMMONS 313, 313 (Brett M. Frischmann et al. eds., 2014).

[23] *See* Peter S. Menell & Suzanne Scotchmer, *Intellectual Property Law*, *in* 2 HANDBOOK OF LAW AND ECONOMICS 1473, 1476–78 (A. Mitchell Polinsky & Steven Shavell eds., 2007).

[24] *See* Stuart J.H. Graham et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 BERKELEY TECH. L.J. 1255, 1283–87 (2009). To be fair, this finding is somewhat industry specific, as discussed in more detail below. *See id.* at 1286; *infra* text accompanying notes 35–38.

[25] *See, e.g.*, Richard C. Levin et al., *Appropriating the Returns from Industrial Research and Development*, 3 BROOKINGS PAPERS ON ECON. ACTIVITY 783, 795 (1987) ("Firms may sometimes refrain from patenting processes to avoid disclosing either the fact or the details of an innovation."); Wesley M. Cohen et al., *Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)* 2–3 (Nat'l Bureau of Econ. Research, Working Paper No. 7552, 2000), http://www.nber.org/papers/

of a patent is extremely small . . . [,] the overwhelming majority of patents have no value whatsoever, and of those that have value, it is nearly impossible to determine ex ante,"[26] give rise to what some call a "patent paradox":[27] if patents provide little incentive, why do companies patent? A range of answers has been offered: patents may be useful for maintaining super-competitive prices, as means for specializing across the innovation value chain and generating licensing revenues, developing an arsenal for cross-licensing, securing investment and financing, as assets in bankruptcy, as means to block others from patenting or to block others from effectively using their own patented technology, and for public relations or improving a firm's image.[28]

The most comprehensive recent effort to examine empirically the relationship between IP and entrepreneurship is the Berkeley Patent Survey.[29] That study surveyed 1,332 early-stage technology companies on a range of issues related to patenting and entrepreneurship.[30] It found that startup companies patent for a wide variety of reasons and that there is much nuance and context-specificity in those reasons.[31] Most basically, for example, it found that patent holdings among startup companies vary by industry, with biotechnology and medical device companies much more likely to hold patents and to hold more of them than software or internet firms.[32] This industry differentiation held true across the range of findings in the study.[33]

With respect to the reasons why startups patent, the study found that preventing others from copying one's invention is the primary driver of startup patenting.[34] But firms use multiple appropriation strategies to realize value from their investments in research and development ("R&D"),[35] and the extent to which patents are an important part of those strategies varies with both the industry and the specific technology at issue. For example, biotech companies collectively ranked patenting

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w7552.pdf [https://perma.cc/F6Y6-P2JY] (discussing prevalence of patents and other appropriation mechanisms among manufacturers).

[26] Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, 154 U. PA. L. REV. 1, 5 (2005).

[27] *Id.*

[28] For a comprehensive review, see Stuart J.H. Graham & Ted Sichelman, *Why Do Start-Ups Patent?*, 23 BERKELEY TECH. L.J. 1063, 1071–82 (2008).

[29] *See* Graham et al., *supra* note 24, at 1255; *see also* Ted Sichelman & Stuart J.H. Graham, *Patenting by Entrepreneurs: An Empirical Study*, 17 MICH. TELECOMM. & TECH. L. REV. 111 (2010).

[30] Graham et al., *supra* note 24, at 1255.

[31] *Id.*

[32] *Id*. at 1278–79.

[33] *Id.* at 1278–83.

[34] *See id.* at 1297; *see also* Sichelman & Graham, *supra* note 29, at 153.

[35] *See* Graham et al., *supra* note 24, at 1289–90 & fig.1; *see also* David J. Teece, *Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy*, 15 RES. POL'Y 285, 287 (1986) (discussing the costs and benefits of first-mover advantage and ownership of complementary assets).

as their most important appropriation strategy;[36] IT hardware firms and medical device startups ranked patenting second behind first-mover advantage;[37] and venture-backed IT hardware firms ranked patenting as important as secrecy in capturing the returns from R&D.[38] These appropriability strategies also can vary with the *type* of innovation at issue. The study found that "patenting is almost twice as important for product innovators than for process innovators."[39]

Patents also may be thought to play a role in product development, particularly for startups that lack the capital to scale up their technological developments for manufacturing and commercialization. In theory, patenting might help to enable the exchange of technological information without fear of appropriation before payment.[40] A literature on "markets for technology" takes this view, and emphasizes the importance of a patent to the broader process of information exchange that accompanies research and development partnerships.[41] A corollary is that patenting facilitates the development of specialized business models based on licensing out technologies.[42] Survey data suggests that this view too is complicated. The startups surveyed in the Berkeley Patent Survey, for example, collectively ranked "obtain[ing] licensing revenues" as one of the least important reasons for securing a patent, which "might seem to conflict with the markets-for-technology view that small firms are more likely to license their patents because vertical specialization allows these firms to operate in upstream technology markets and provide technology inputs to (generally large) firms operating in downstream product markets."[43] At the same time, however, the authors find support for "the view that the smallest of startup firms rely more on patenting for licensing than larger firms,"[44] and that biotechnology firms generally place a greater emphasis on licensing than firms in other industries.[45] But even the biotech story is more complicated. Although

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[36] *See* Graham et al., *supra* note 24, at 1290–91.

[37] *See id.* at 1291. "First mover advantage" allows firms to reap super-competitive returns on their investments in R&D during the time that they have the market to themselves before competitive imitation. *See, e.g.*, Teece, *supra* note 35, at 287.

[38] *See* Graham et al., *supra* note 24, at 1292.

[39] *Id.* at 1293.

[40] This is known in the literature as the disclosure paradox. *See* Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, *in* THE RATE AND DIRECTION OF INVENTIVE ACTIVITY: ECONOMIC AND SOCIAL FACTORS 609, 615 (Nat'l Bureau Comm. for Econ. Research & Comm. on Econ. Growth of the Soc. Sci. Research Council eds., 1962). Consistent with the argument advanced in this Article, in previous work I argued that intellectual property is not the necessary or sole mechanism for solving this paradox. *See* Michael J. Burstein, *Exchanging Information Without Intellectual Property*, 91 TEX. L. REV. 227, 228 (2012).

[41] *See, e.g.*, ASHISH ARORA ET AL., MARKETS FOR TECHNOLOGY: THE ECONOMICS OF INNOVATION AND CORPORATE STRATEGY 1 (2001).

[42] *See, e.g.*, Ashish Arora & Robert P. Merges, *Specialized Supply Firms, Property Rights and Firm Boundaries*, 13 INDUS. & CORP. CHANGE 451, 452 (2004).

[43] Graham et al., *supra* note 24, at 1301–02.

[44] *Id.* at 1302.

[45] *Id.* at 1303; Sichelman & Graham, *supra* note 29, at 164.

it is "well-documented that . . . biotechnology startups typically form alliances with incumbents to clear costly regulatory hurdles and bring their innovations to market,"[46] biotech firms cited a reluctance to disclose the information necessary to secure a patent as their primary reason for *forgoing* patent protection.[47]

Finally, patents appear to play a role in securing entrepreneurial financing, but the existing evidence sheds little light on the nature of that role. There is a fair amount of evidence that different sources of entrepreneurial finance—most notably venture capital, but also sources of debt financing—find patents valuable in making their investment decisions. Three-quarters of venture-backed respondents in the Berkeley Patent Survey reported that a potential funding source with whom they negotiated "indicated that having patents was important to their funding decision."[48] This finding is consistent with econometric studies that have shown that more intensive patenting by startups in the software and biotechnology sectors is associated with greater total investment and number of financing rounds,[49] and with recent work drawing a similar correlation between patents and venture lending.[50] But although the correlation appears clear, causation is much murkier. One suggestion is that patents serve as signals to financing sources, either of the quality of the underlying technology or of the management team and its strategic positioning.[51] Alternatively, patents may help startups secure freedom to operate, thereby making their business models more attractive to investors;[52] or they could serve as assets in bankruptcy[53] or as collateral.[54] Survey data generally cannot sort out these competing explanations.[55] While some qualitative work suggests that patents are unlikely to be the driving force behind financing in the software industry,[56] more systematic investigation is needed.

A distinct line of inquiry asks how startups encounter the patent system other than through their own patenting activities. How, in other words, does the patent system affect startups more broadly? One point of contact separate and apart from a firm's own patenting is its licensing of others' patents. Licensing generally can be

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[46] Sichelman & Graham, *supra* note 29, at 164.

[47] *See* Graham et al., *supra* note 24, at 1313.

[48] *Id.* at 1307.

[49] For an overview of this literature, see Sichelman & Graham, *supra* note 29, at 122–23 & nn.54–56.

[50] *See* Yael V. Hochberg et al., Patent Collateral, Investor Commitment, and the Market for Venture Lending 1, 9–11 (Aug. 10, 2015) (unpublished manuscript), http://www.econ.upf.edu/~cserrano/papers/HSZ_paper.pdf [https://perma.cc/KGD5-74PK].

[51] *See, e.g.*, David H. Hsu & Rosemarie H. Ziedonis, *Resources As Dual Sources of Advantage: Implications for Valuing Entrepreneurial-Firm Patents*, 34 STRATEGIC MGMT. J. 761, 761–62 (2013); Clarisa Long, *Patent Signals*, 69 U. CHI. L. REV. 625, 627–28 (2002).

[52] *See* Graham et al., *supra* note 24, at 1306.

[53] *See id.* at 1306–07.

[54] *See* Hochberg et al., *supra* note 50, at 2–4.

[55] *See* Graham et al., *supra* note 24, at 1307.

[56] *See* Ronald J. Mann, *Do Patents Facilitate Financing in the Software Industry?*, 83 TEX. L. REV. 961, 963–68 (2005).

ex ante, that is, "*before* the purchaser has obtained the technology through other means,"[57] or ex post, in which the license is executed "*after* a firm has invested in creating, developing or commercializing the patented technology."[58] The former are generally associated with technology transfer—the exchange of useful technological information mediated in some cases by the exchange of a patent embodying at least part of that information.[59] The latter has come to be associated with the behavior of patent assertion entities (or "patent trolls") whose business models depend solely on licensing patents, but it more properly refers to enforcement activities by any patent-holding entity.[60] Putting aside a vigorous debate in the academic literature about whether ex post licensing activity is socially valuable, these two types of licensing present quite different opportunities and challenges for startup companies.

Existing studies have focused on determining which mode of licensing is more common. The Berkeley Patent Survey found evidence of both kinds of activity, with some significant industry differentiation—biotechnology firms appear more frequently than venture-backed IT firms to take a license at least in part for the purpose of gaining access to knowledge.[61] More recent (but somewhat limited) survey data suggests that across the range of industries an increasing number of licensing demands, whether from practicing or nonpracticing entities, are ex post rather than ex ante.[62] Approaching the issues from the opposite direction, Colleen Chien finds that the activities of patent trolls are disproportionately directed at startup companies because such companies are more likely to pay nuisance settlements than established companies with deeper pockets.[63]

The existing literature on patenting and entrepreneurship described above yields two important conclusions. The first is that the relationship between the patent system and entrepreneurial activity is complex and multifaceted. Patents influence many aspects of startup behavior in many different ways. The second is that this relationship is highly context-dependent; it depends on industry, firm structure, and technology. But this literature ultimately raises more questions than it answers. It offers little of the rich contextual detail needed to understand the complexity that it suggests. In part this is likely due to methodological limitations. Survey data in particular is useful in providing insights into trends and big-picture assessments, but necessarily loses detail. This methodology also expressly takes the existing arrangement of the patent system as a given. To the extent that policy prescriptions follow from its conclusions, they tend to be focused on adjustments to the existing system and ignore its alternatives.

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[57] FED. TRADE COMM'N, THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION 40 (2011).

[58] *Id.* at 50.

[59] *See id.* at 7–8.

[60] *See id.* at 8–9.

[61] *See* Graham et al., *supra* note 24, at 1317–18.

[62] *See* Robin Feldman & Mark A. Lemley, *Do Patent Licensing Demands Mean Innovation?*, 101 IOWA L. REV. 137, 156–66 (2015).

[63] *See* Colleen Chien, *Startups and Patent Trolls*, 17 STAN. TECH. L. REV. 461, 485–86 (2014).

In the following Parts, this Article proposes a shift in the way that we conceive of the relationship between intellectual property and entrepreneurship as both a substantive and methodological matter.

## III. FROM RESOURCE TO KNOWLEDGE TO ENTREPRENEURIAL COMMONS

In the following sections, I reconceptualize the relationship between intellectual property and entrepreneurship as a kind of knowledge commons. In so doing, I seek to shift the focus of analysis from startups' reactions to the existing patent system to startups' behavior with respect to the information resources that form critical parts of their businesses. This enables us to widen the lens and examine intellectual property as one of a number of tools used to implement and sustain certain functional relationships, rather than as an exogenously defined set of rules. It also focuses attention on those relationships within communities rather than on the actions of single firms. And it entails a shift in methodology toward case study research.

The reconceptualization proceeds in three steps.

### *A. Resource Commons*

In their pioneering work on commons-based resources, Elinor Ostrom and her collaborators explained the persistence of self-governing institutions that could manage natural resources in the absence of state-based property or regulatory regimes.[64] Her examples of the management of "common pool resources" range from Spanish irrigation districts, to the lobster gangs of Maine, to Japanese fisheries. These (mostly) natural resources are of the type that we would ordinarily think subject to the "tragedy of the commons."[65] They are too large to facilitate inexpensive exclusion, the resources are not subject to joint use, and improvement efforts are shared among all users.[66] Individuals acting rationally according to their self-interest fail to exercise restraint in resource use, and the resource is depleted.[67] Prior to Ostrom's work, conventional wisdom held that there were only two solutions to this problem: privatization through the assignment of property rights so that the rightsholder would see the full costs and benefits of her management

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[64] *See* OSTROM, *supra* note 20, at 29–35; *see also* Yochai Benkler, *Commons and Growth: The Essential Role of Open Commons in Market Economies*, 80 U. CHI. L. REV. 1499, 1508 (2013) (book review) (distinguishing between state-based and cooperative "proprietary claims of exclusion, use, and disposition").

[65] Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1243, 1244–45 (1968); *see* OSTROM, *supra* note 20, at 2–7 (describing the dynamic of resource overuse in a commons as a "tragedy of the commons," a "prisoner's dilemma," and a problem of "collective action").

[66] *See* OSTROM, *supra* note 20, at 30–31.

[67] *See* Hardin, *supra* note 65, at 1244–45.

practices, on one hand;[68] and government regulation to manage externalities, on the other.[69]

Ostrom offered two seminal contributions.[70] First, she found that collective action to manage common pool resources sustainably could and did in fact occur without either privatization or government regulation.[71] The key to facilitating such collective action was the development of institutions—

> sets of working rules that are used to determine who is eligible to make decisions in some arena, what actions are allowed or constrained, what aggregation rules will be used, what procedures must be followed, what information must or must not be provided, and what payoffs will be assigned to individuals dependent on their actions.[72]

The Spanish *huerta* irrigation districts could be sustained because of a detailed set of governance practices that were established and followed by the community even in the absence of formal law.[73] These practices are necessarily highly context-specific. They are tailored to the particular local conditions, geographies, and demographics. And they are facilitated through institutions that are intermediate between private property and the state.[74]

This leads to Ostrom's second contribution: a methodology for systematically studying natural resource commons, drawing commonalities and differences among them, and generalizing best and worst practices.[75] Ostrom's "institutional analysis and development" framework structures a common set of research questions to apply across diverse contexts so that information gleaned from individual case studies can be aggregated.[76]

### *B. Knowledge Commons*

In recent years, a number of scholars have demonstrated that Ostrom's work can be adapted to study the production of information-based goods.[77] Instead of the

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[68] *See* OSTROM, *supra* note 20, at 12–13.
[69] *See id.* at 8–11.
[70] *See* Frischmann, *supra* note 19, at 388.
[71] *Id.* at 390–92.
[72] OSTROM, *supra* note 20, at 51.
[73] *See id.* at 69–82.
[74] *See id.* at 88–90.
[75] Frischmann, *supra* note 19, at 393.
[76] *See* ELINOR OSTROM, UNDERSTANDING INSTITUTIONAL DIVERSITY 13–15 (2005).
[77] *See* Michael J. Madison et al., *Constructing Commons in the Cultural Environment*, 95 CORNELL L. REV. 657, 675–83 (2010). Elinor Ostrom and Charlotte Hess recognized the links between natural resource and information commons as well. *See* Charlotte Hess & Elinor Ostrom, *Ideas, Artifacts, and Facilities: Information as a Common-Pool Resource*, 66 LAW & CONTEMP. PROBS. 111, 128–34 (2003). For an application, see, e.g., Timothy

tragedy of the commons, the problem to be overcome with respect to managing information resources is that of underproduction: the nonrivalrous and nonexcludable nature of information presents a disincentive to innovate because the fruits of investment in research and development can be taken by others freely.[78] And just as in the natural resources context, the conventional wisdom holds that this underproduction problem must be remedied either through privatization—in the form of intellectual property rights—or through government provision, like research grants.[79]

Noting that "cultural production is an inherently social phenomenon, taking place over a wide range of scales and within a complex, overlapping variety of formal and informal institutional structures," [80] Madison, Frischmann, and Strandburg posit that there are institutional structures intermediate between exclusive rights and government provision that allow for collective action to produce intellectual goods even in the face of the economic challenges described above.[81] Examples abound: patent pools, open-source software, Wikipedia, the Associated Press, jamband fan communities, and others.[82] Each of these communities utilizes a set of institutional rules—sometimes intertwined with formal law, sometimes not—to manage the production and dissemination of information.

To be sure, Ostrom's framework for research into collective action to manage natural resource communities does not map perfectly onto innovation environments. This is particularly so because such environments involve not only management of resources, but also the *production* of intellectual goods.[83] Nevertheless, the analogy remains a good one. Collective action problems in the natural environment may lead to overuse of resources in the absence of a governance structure; so too in the cultural or innovative environment may collective action problems lead to underproduction.[84] Barriers to collective action for the production of innovation can be lowered through governance mechanisms.

To investigate systematically the nature of those governance structures, Frischmann et al. set forth a series of questions to answer about the relevant communities, actors, and activities.[85] Broadly speaking, they include questions about: the background environment, such as the legal context and the "default" role of intellectual property in respect of the resources to be produced; the various attributes of the community, including the characteristics of the resource sought to be produced and managed, the profiles of the relevant communities members and their varying roles, and the goals and objectives of the commons and its members;

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Simcoe, *Governing the Anticommons: Institutional Design for Standard-Setting Organizations*, 14 INNOVATION POL'Y & ECON. 99, 100 (2014).

[78] *See* Menell & Scotchmer, *supra* note 23, at 1476–77.

[79] *See id.* at 1477–79.

[80] Madison et al., *supra* note 77, at 669.

[81] *See id.* at 702–07.

[82] *See* Frischmann et al., *supra* note 18, at 3–6.

[83] *See* Madison et al., *supra* note 77, at 672, 680.

[84] *See id.* at 675, 691–92.

[85] *See* Frischmann et al., *supra* note 18, at 20–21.

the governance mechanisms, formal and informal, of the commons, including things like institutional and technological architectures, legal structures, and decision rules; and finally the patterns and outcomes of the commons including the benefits and costs to various members.[86]

"Knowledge commons" is "shorthand for the institutionalized community governance of the sharing of and, in some cases, creation of information, science, knowledge, [or] data."[87] And the questions above help to develop nuanced data about the characteristics of knowledge commons.

### *C. The Entrepreneurial Commons*

Entrepreneurial activity often has the characteristics of a knowledge commons. Information production and management lies at the core of entrepreneurship. And the information that drives value for entrepreneurs must often be shared with others—development partners, funders, even competitors—in order for it to be useful.

Most definitions of entrepreneurship require some element of novelty or innovation. Modern scholars of entrepreneurship define it in terms of the creation and exploitation of entrepreneurial opportunities, which in turn are novel or innovative business ideas.[88] Joseph Schumpeter, often regarded as the father of the modern economics of entrepreneurship, defined five categories of entrepreneurial activity, all of which emphasized novelty: new goods; new methods of production; new geographical markets; new raw materials; and new ways of organizing.[89] There is some debate in the literature about whether entrepreneurship requires innovation in the "strong sense" of new technologies that shake up established industries,[90] or the "weak sense" of finding new business opportunities.[91] But regardless of the sense in which "novelty" or "innovation" is used, it inevitably requires the generation of new information. This is most obvious in the case of new products. As described

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[86] *Id.*

[87] *Id.* at 3.

[88] *See, e.g.*, SCOTT SHANE, A GENERAL THEORY OF ENTREPRENEURSHIP: THE INDIVIDUAL-OPPORTUNITY NEXUS 4 (2003) ("Entrepreneurship is an activity that involves the discovery, evaluation and exploitation of opportunities to introduce new goods and services, ways of organizing, markets, processes, and raw materials through organizing efforts that previously had not existed."); Smith & Ibrahim, *supra* note 15, at 1540 (noting that Jonathan T. Eckhardt and Michael P. Ciuchta define entrepreneurship as "the discovery, evaluation, and exploitation of entrepreneurial opportunities" (quoting Jonathan T. Eckhardt & Michael P. Ciuchta, *Selected Variation: The Population-Level Implications of Multistage Selection in Entrepreneurship*, 2 STRATEGIC ENTREPRENEURSHIP J. 209, 209 (2008)).

[89] *See* JOSEPH A. SCHUMPETER, THE THEORY OF ECONOMIC DEVELOPMENT: AN INQUIRY INTO PROFITS, CAPITAL, CREDIT, INTEREST, AND THE BUSINESS CYCLE 66 (Redvers Opie trans., Harvard Univ. Press 1934).

[90] *See* Smith & Ibrahim, *supra* note 15, at 1541. This is Schumpeter's conception of the entrepreneur. *See* SCHUMPETER, *supra* note 89, at 66.

[91] *See* Smith & Ibrahim, *supra* note 15, at 1542.

above, the patent system has long been premised on the idea that the invention and development of new products requires exclusive rights in the information that underlies them.[92] Indeed, any new product can be conceived as the embodiment of the information required for its manufacture.[93] This is no less true of other entrepreneurial opportunities. New methods of production are also a combination of artifacts and information—the merger of capital equipment with processes and procedures. New ways of organizing or new business models are solely information-based. They require implementation through the use of organizational forms and procedures, but the information required to carry them out often can be codified and transmitted. New markets are similarly founded upon information about the market opportunity; entry into a new market is valuable only so long as competitors remain unaware of the market opportunity. Consistent with the patent system's focus on information, each of these entrepreneurial opportunities also has occasioned debate about whether intellectual property protection would result in the generation of more such opportunities.[94]

Entrepreneurship requires not only the creation of information, but also its management. An idea for a new product may be a critical source of value, but it is not likely to become a commercialized product without communication and coordination among many parties. Information exchange is critical in at least three distinct but overlapping functions of entrepreneurial firms: product development, competitive strategy, and funding. In each of these functions, the successful management of information is essential to success. And in each of these functions, there is evidence that the role of intellectual property is ambiguous. It is only one of many strategies that firms employ to manage the information at their disposal.

Of course, these three functions are iterative and overlap in complex ways. But it is useful as an initial matter to be clear about how they work independently, and then to investigate their interactions.

### *1. Product Development*

It has become common to observe that there is a difference between "invention" and "innovation," between the conception of a new idea and its commercial development.[95] The two usually require different skill sets. Conceiving a new idea or new product is different from developing a working prototype, scaling up

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[92] *See* Menell & Scotchmer, *supra* note 23, at 1478–80.

[93] *See* 1 CARLISS Y. BALDWIN & KIM B. CLARK, DESIGN RULES: THE POWER OF MODULARITY 2 (2000) (drawing a distinction between "artifacts" and their information content).

[94] *See, e.g.*, Bilski v. Kappos, 561 U.S. 593, 648–56 (2010) (Stevens, J., concurring) (business methods); Michael Abramowicz & John F. Duffy, *Intellectual Property for Market Experimentation*, 83 N.Y.U. L. REV. 337, 338–45 (2008) (market feasibility tests).

[95] The distinction is usually attributed to Schumpeter. *See* JOSEPH A. SCHUMPETER, CAPITALISM, SOCIALISM, AND DEMOCRACY 84 (2d ed. 1947). For discussion in the legal literature, see Burstein, *supra* note 40, at 237–41; Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 348–54 (2010) (describing the commercialization process).

production, market testing and marketing, distributing, and making follow-on improvements.[96] In order to access those skill sets, inventors need to communicate their ideas to others. But doing so may be difficult or costly. For one thing, economic theory predicts that there will be high transaction costs to information exchange, mostly in the form of the "disclosure paradox" described above.[97] For another, information often has characteristics that make it difficult to transfer—it may be tacit, for example, and therefore difficult to codify and share.[98]

Entrepreneurial firms have a variety of strategies for overcoming these problems. Some of them rely on intellectual property—patents can both solve the disclosure paradox in some circumstances by making information excludable[99] and can facilitate information codification and exchange.[100] Others do not. Entrepreneurs in the biotech industry, for example, often rely upon the partial excludability of knowledge required to implement certain research tools to allow development partners and customers to gain sufficient knowledge to transact over the tools while simultaneously protecting against misappropriation.[101] In software, strong norms of sharing emerge in some communities, sometimes backed up by IP- or contract-based restrictions on that sharing. In short, a complex set of tools can be brought to facilitate the exchange of knowledge required for product development.

It is worth noting two additional wrinkles to this problem. First, firms also face and respond to information exchange problems internally. Even if a firm chooses not to go outside its boundaries to access particular skill sets in product development, it must still organize and manage information flows among its own employees.[102] The relationships among the firm's owners and managers and its employees with respect to information are sometimes shaped by intellectual property,[103] but more often shaped by internal practices, background rules and norms, and various legal rules governing trade secrets.[104]

Second, product development often is iterative. It can require not only the transmission of information, but also the generation of new ideas and knowledge in response to the needs of the development process. Collaboratively doing so presents special governance challenges and requires innovative governance arrangements. Gilson, Sabel and Scott call such arrangements "contracts for innovation," in which

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[96] *See* Burstein, *supra* note 40, at 238.

[97] *See supra* note 40 and accompanying text.

[98] *See* Burstein, *supra* note 40, at 251–54; Peter Lee, *Transcending the Tacit Dimension: Patents, Relationships, and Organizational Integration in Technology Transfer*, 100 CALIF. L. REV. 1503, 1503–04 (2012).

[99] *See* Arrow, *supra* note 40, at 616–17.

[100] *See* Dan L. Burk, *The Role of Patent Law in Knowledge Codification*, 23 BERKELEY TECH. L.J. 1009, 1017–18 (2008).

[101] *See* Burstein, *supra* note 40, at 254–55.

[102] *See* Dan L. Burk & Brett H. McDonnell, *The Goldilocks Hypothesis: Balancing Intellectual Property Rights at the Boundary of the Firm*, 2007 U. ILL. L. REV. 575, 591–99.

[103] *See id.*

[104] *See* Orly Lobel, *The New Cognitive Property: Human Capital Law and the Reach of Intellectual Property*, 93 TEX. L. REV. 789, 804–13 (2015).

the contracting parties agree to work together toward an underspecified goal, with the idea of developing and applying new knowledge throughout the course of the collaboration.[105] The contracts they describe to implement these arrangements do not set traditional terms like price and quantity, but rather specify the governance mechanisms that will enable the parties to build trust and collaborate over time.[106]

*2. Competitive Strategy*

Entrepreneurial strategies, particularly in technology-based industries, are often described as problems of *appropriability*. That is, how do firms appropriate the gains from their investments in creating and exploiting entrepreneurial opportunities?[107] But the appropriability problem can also be cast as a problem of information management. Entrepreneurial firms need to determine the extent to which their competitive advantage derives from unique information and then to decide how to manage that information in such a way as to maintain the competitive advantage. There are at least two dimensions to this task. The first is figuring out how to monetize the firm's innovation; how to use the information to generate revenue? Sometimes this is straightforward, as with sales of a new product; other times, it is more complicated, as when, for example, a firm may choose to earn revenue through licensing or to use a new process to gain an advantage in manufacturing an old product. The second dimension concerns the firm's position in the competitive environment. The firm's monetization strategy depends in no small part on the ease with which competitors may enter and compete, on the industrial organization of the relevant industry, and on the need to differentiate itself on the basis of any number of factors.

All of these decisions turn in some part on the degree to which the firm's core information assets may be transferred—willingly or unwillingly—in the competitive environment. Some information assets are self-revealing; once they are released into the world, competitors can immediately glean the relevant information and begin competition.[108] The design of a paper clip, for example, can be gleaned simply from observation. Others require more expensive reverse engineering (or may be impossible to reverse engineer—the formula for Coca-Cola is the canonical example).

Now return to the examples from the early and late telephone industry with which this Article began. Bell's telephone system was easily copied.[109] The industry in which he was competing was marked by a large monopolist in a position to appropriate the technology and implement it (or suppress it) entirely on its own. In

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[105] *See* Ronald J. Gilson et al., *Contracting for Innovation: Vertical Disintegration and Interfirm Collaboration*, 109 COLUM. L. REV. 431, 494 (2009).

[106] *See id.* at 457–58.

[107] *See* Teece, *supra* note 35, at 287.

[108] *See* Katherine J. Strandburg, *What Does the Public Get? Experimental Use and the Patent Bargain*, 2004 WIS. L. REV. 81, 104–18.

[109] Indeed, as described above, it was simultaneously invented by more than just one person. *See supra* notes 1–6 and accompanying text.

that context, Bell's IP-based exclusion strategy made some sense. Vonage, by contrast, operated in a vastly different competitive environment. IP-based telephony protocols were not easily copied but were also poor fits for IP protection, because they could be designed around. Putting aside the IP threats from incumbent carriers, Vonage operated in a space in which network effects and first-mover advantages rather than IP were the primary drivers of appropriability. IP here was a hindrance rather than a help.

The point here is not to map all of the circumstances or factors that may bear on firms' competitive information management decisions. It is instead simply to highlight the fact that such decisions are complex and context-specific.

*3. Fundraising*

Entrepreneurial startups need cash. Once they have exhausted friends and family, personal credit cards, and other such readily available sources, they need to access capital markets. And to do so, in turn, requires information exchange similar to that described above. Indeed, in fundraising the challenge may be even greater. On one hand, entrepreneurial firms need to communicate about their assets and business plans with potential sources of capital. This raises the same disclosure paradox problems as product development.[110] But there is moral hazard on the other side of the relationship as well, as venture capitalists must be sufficiently confident ex ante that their portfolio companies will not simply take their money and run. Robert Cooter refers to this as the "double trust dilemma."[111] Again, the mechanisms that entrepreneurs and investors utilize to overcome this dilemma are varied and context-specific. But they tend to focus on the effects of reputation. Venture capitalists are repeat players in the market for startups, just as many entrepreneurs themselves engage in serial business building.[112]

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Of course, these three spheres of activity are not completely independent. They overlap and interact in complex ways. The discussion to this point has focused on functions rather than actors. But it is often the case that entrepreneurs, their development partners, and their sources of financing engage in several of these activities at the same time. Venture capitalists, for instance, often occupy seats on the boards of directors of startups they invest in. In that capacity, they are responsible not only for funding, but also for aspects of product development and strategic planning. Entrepreneurs similarly wear multiple hats. And there are often other

[110] *See supra* notes 97–108 and accompanying text.

[111] ROBERT D. COOTER & HANS-BERND SCHÄFER, SOLOMON'S KNOT: HOW LAW CAN END THE POVERTY OF NATIONS 27 (2012) (ebook) ("To develop an innovation, the innovator must trust the investor not to steal his idea, and the investor must trust the innovator not to steal his capital.").

[112] *See* Burstein, *supra* note 40, at 270.

actors involved in entrepreneurial ventures—universities, for example. Together, these actors playing multiple roles make up entrepreneurial communities capable of at least rough definition. Indeed, entrepreneurial communities are often characterized by the presence of networks of individuals all engaged in various forms of information sharing.[113] And these networks are often localized in particular geographies. Silicon Valley and Cambridge, Massachusetts, for example, are well-known "innovation clusters."[114] In such clusters, industry, government, academia, and finance co-locate in ways that facilitate communication and collaboration. These environments tend to be rich in entrepreneurial activity and are often referred to as "ecosystems."[115]

That parallelism with the original source of institutional commons research is telling. Entrepreneurial activity, as described above, is in many ways similar to the management of a natural resource commons. Entrepreneurial communities engage in the production and management of new information and knowledge. Indeed, that is at the core of entrepreneurial activity. And they do so through varied and context-specific institutional mechanisms that include, but are not limited to intellectual property. The relationship between IP and entrepreneurship is therefore much different from the way in which it has traditionally been portrayed in the legal literature on innovation.

At this point, it is worth pausing to address a couple of related objections to characterizing entrepreneurial activity as a commons. The first is rhetorical. It may seem incongruous at best to describe entrepreneurial ventures in the same breath as, say, Wikipedia.[116] And if entrepreneurship can be modeled as an instance of commons governance, cannot the same thing be said of big corporations? Is Pfizer a commons?[117] The second is practical: how much room is there for commons-style sharing in a profit-making enterprise? Because profit emerges only from private goods that are rivalrous and excludable, how can profit-seeking entities sustainably support commons governance?

Both objections can be answered by recognizing that a "commons" "does not denote the resources, the community, a place, or a thing."[118] It is instead "the institutional arrangement of those elements" to create a "form of community management or governance."[119] It is a set of institutionalized mechanisms for the production and management of a particular resource—in this case, information. The

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[113] *See, e.g.*, Walter W. Powell et al., *Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology*, 41 ADMIN. SCI. Q. 116, 116–20 (1996).

[114] *See* SAXENIAN, *supra* note 17, at 1–4.

[115] *See, e.g.*, Abraham J.B. Cable, *Startup Lawyers at the Outskirts*, 50 WILLAMETTE L. REV. 163, 164 (2014).

[116] *See supra* note 19 and accompanying text.

[117] *See* Amy Kapczynski, *Is Pfizer a Commons?*, Presentation at Medical User Innovation and Medical Knowledge Commons Workshop, NYU School of Law, May 15, 2014.

[118] Frischmann et al., *supra* note 18, at 2.

[119] *Id.*

governance of that resource is conceptually separable from the goals of the participants. Commons governance is, in other words, a *means* rather than an *end*. And commons-based information management is consistent with a wide variety of ends, including profit-making ends. Consider, for example, that the open-source software community—long the poster child for commons-based production[120]—includes profit-making entities like Red Hat, a provider of services for users of open-source software, that have built successful business models around sustainable commons management. Or consider the many user-innovation communities that exchange information in the course of amateur pursuits but eventually spawn profit-making entrepreneurial entities to implement at a larger scale many of the user innovations generated by the commons.[121]

## IV. CONCLUSION: STUDYING THE ENTREPRENEURIAL COMMONS

Reconceptualizing entrepreneurial activity as a knowledge commons leads us to ask a different set of questions than previous studies have, and to utilize a different set of methodological tools. As Part II described, existing approaches to understanding the relationship between IP and entrepreneurship focus on the firm and its reactions to various IP laws. By contrast, to the extent that the exemplar entrepreneurial activities described in Part III can be described as instances of commons governance, the analysis must necessarily be broader. The knowledge commons framework forces us to acknowledge that much of information production and dissemination depends on relationships among individuals and their interactions with the background competitive environment and the legal and market factors that shape it.

Frischmann and his collaborators articulate a standard set of questions for investigating knowledge commons that should prove readily adaptable to the study of the entrepreneurial commons. They ask about:[122]

- The background environment—the legal and cultural context in which the activity exists; and the "default" IP status of the relevant resources. Here, the evidence so far suggests much variation. The "default" IP status of any given information resource, for example, tends to be industry-specific.[123] The background legal and cultural context tends to vary with geography.[124]

- The attributes of the resources at issue, the community members, and the goals and objectives of the various parties. Here, the analysis will focus

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[120] *See, e.g.*, Yochai Benkler, *Coase's Penguin, or, Linux and* The Nature of the Firm, 112 YALE L.J. 369, 371–81 (2002); *see also* Frischmann et al., *supra* note 18, at 3–4.

[121] *See, e.g.*, Shah & Mody, *supra* note 22.

[122] *See* Frischmann et al., *supra* note 18, at 20.

[123] *See* DAN L. BURK & MARK A. LEMLEY, THE PATENT CRISIS AND HOW THE COURTS CAN SOLVE IT 49–65 (2009).

[124] *See* SAXENIAN, *supra* note 17, at 4.

on the business. What is the technology? Who is involved? What are their goals and objectives? The traditional analysis of IP and entrepreneurship elides much of this detail. It assumes a single company and asks how that company responds to externally set rules. The knowledge commons framework instead broadens the analysis to include a wider variety of actors who influence the course of entrepreneurial activity. This in turn enables more fine-grained analysis of the mechanisms of information management.

- The governance of the commons—the spheres of activity and the formal and informal rules, norms, and decision makers that govern that activity; and finally about the patterns and outcomes of the activity.[125] This set of questions focuses on the interactions among diverse community members outlined above. It focuses on how information actually is produced and managed without biasing the analysis in the first instance through a focus on intellectual property. IP may well be important in many settings; in others it may be of little importance; and, more likely, it plays a nuanced role alongside other rules, norms, and decisions.

- Patterns and outcomes—what benefits are delivered to participants; what are the costs and risks associated with commons management?

Methodologically, these questions are best answered in the context of a case study. Ostrom's and Frischmann's groups rely primarily on qualitative, ethnographic studies of particular communities. That methodology allows for deep exploration of the questions posed above. In particular, case studies will help to surface the multiple strategies that entrepreneurial firms utilize to manage information sharing—including those that utilize IP in various ways, and those that do not. Although it is of course difficult to generalize from any single case study, the accumulation of such studies can lead to generalizable results.

Framing the relationship between intellectual property and entrepreneurship in the terms described above leads both to a positive and normative research agenda. As a descriptive matter, there is much to be gained from systematically studying these questions in a variety of different contexts. Indeed, a fuller picture of the relationship requires numerous case studies of different firms and different industries. From this descriptive knowledge base, normative conclusions about changes to our intellectual property laws and rules that would benefit entrepreneurs can more readily and justifiably be drawn.

[125] *See id.* at 7.